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OAK RIDGE Y-12 PLANT INFORMATION CONTROL FORM

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Signature 3/3/95 Date

Signature Date

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M. L. Bond 3/17/95

Technical Information Office Date

DIVISION	DEPARTMENT	SECTION —	BUILDING	ROOM
Industrial Relations	Medical Department	Industrial Hygiene	[illegible] 9706-2	34

DESCRIPTION OF RECORDS	FROM	THROUGH	CODE NUMBER
Air analyses, reports, information, correspondence. Enclosed in box is a list of all folders included in the box. A through L	1953	1957	~~[illegible]~~ Y-12 2090-1H-4 DOE Hold 1324.7

BOX NUMBER 1 OF 5	LOCATION IN RECORDS CENTER			
		SECTION	TIER	DR.
	Indef.	20	9	15

CLASS OF FILE	RECORDS VERIFIED BY:	DATE
RECORD ☒ NON-RECORD ☐	Bill Everett	2/14/58

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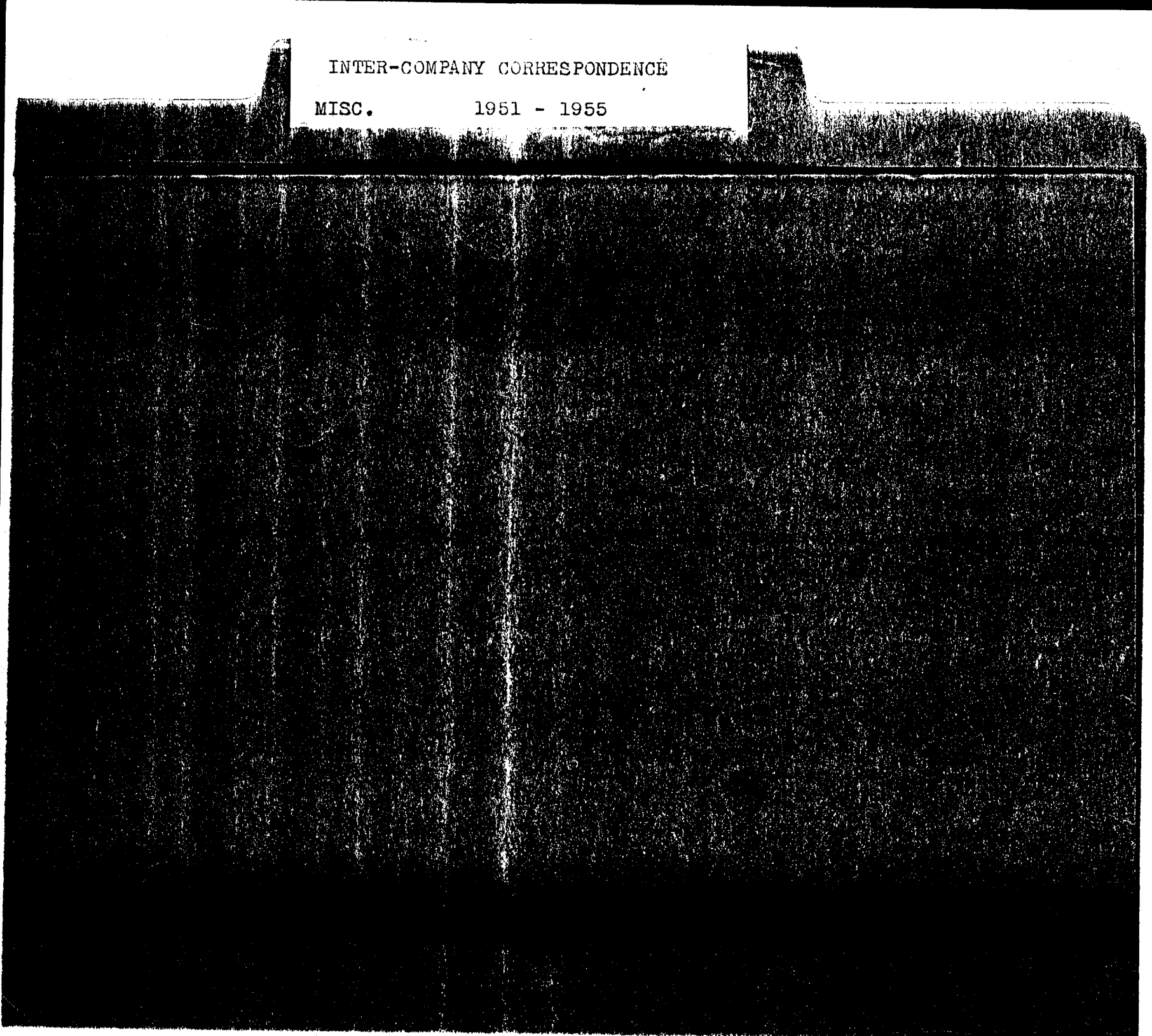
Technical Information Office Date


INTER-COMPANY CORRESPONDENCE
MISC. 1951 - 1955

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box Y OAK RIDGE, TENN.

TO Mr. G. A. Strasser

LOCATION

ATTENTION

COPY TO
J. F. Murray
W. C. Moore
W. A. Pfeiler
S. W. Mitchel
P. F. Galle
G. R. Sullivan, Jr.
L. J. LaFrance
L. C. Emerson
F. A. Harris
J. S. Reece
File (Y-12HoRC)

DATE October 4, 1955

ANSWERING LETTER DATE

SUBJECT Comments on E-1 Foundry, Health Physics Aspect, Ref. - August HP Report

The general air-borne contamination in E-1 foundry is going up although it remains at a level well below the MPL. The reasons for the increase and the proposed corrective measures are two-fold and noted herewith.

1. Large Crucible Burner Area including the Hooding Station and Crucible Cleaning and Storage Area.

While the large crucible burner has performed very well as a burner of crucible skulls, the equipment has several minor deficiencies in method of loading, dumping of crucibles, knockout of crucible plugs and handling of dumped crucibles. This problem has been referred to the Engineering Department through the Project Engineer for E-1 installations, P. F. Galle, as a high priority problem on the basis of the health physics problem in the area.

2. Small Crucible Burner Area.

The small crucible burner has not operated continuously for mechanical reasons. This has been in the hands of Engineering and the Maintenance Division for quite a period of time with some signs of progress in eliminating the difficulties. The high counts in this area (balcony - center of east area and balcony - front of hood east end) have been caused by the necessity for handling oxide and hot crucibles in the open rather than in this burner.

In general, in the foundry, a more extensive cleaning effort is being exerted by the operating shifts to lower the general air count. When the equipment is in desired operating condition, this clean-up campaign should show its effectiveness in lowering general air-borne contamination, smear contamination and, consequently, the urine excretion levels of individual operators.

SIGNED - J. M. CASE

J. M. Case

Misc.

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box Y OAK RIDGE, TENN.

TO Mr. W. A. Pfeiler

LOCATION

DATE July 29, 1955

ANSWERING LETTER DATE

SUBJECT Sunflower Foundries Department 2702

ATTENTION

COPY TO J. P. Murray
G. A. Strasser
W. C. Moore
R. A. Walker
J. M. Case
G. W. Mitchel
P. F. Galle
Dr. C. R. Sullivan, Jr.
L. J. LaFrance
L. C. Emerson
File

Effective July 1, 1955, the operation of B-1 Foundry in 9212 was discontinued as a production area. The Maintenance Division has taken over the area for installation of a shop.

During the period of removal of equipment and renovation of this area, which has been proceeding for months, the production department has handled and will continue to handle, upon request, the removal of metal and oxide contaminants in the air ducts, equipment and general area. The production department was not responsible in the month of June, 1955 for the increase in air contamination levels detected in this area.

The production department requires no more information as to general air contamination in this area as a part of its operational area report. The Maintenance Division may desire such report until the area is completely decontaminated and renovated.

John S. Reece

John S. Reece

FAH:mc

THIS FORM FOR INTER-COMPANY CORRESPONDENCE ONLY

WCC-80 (6-54)

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P, OAK RIDGE, TENN.

TO J. C. Hart

LOCATION

DATE June 22, 1954

ANSWERING LETTER DATE

ATTENTION

COPY TO K. Z. Morgan, A. D. Warden, R. L. Clark, D. M. Davis, J. C. Ledbetter, H. H. Abee, P. E. Brown, O. D. Teague, File (8)

SUBJECT Radiation Excursion in Building 9213

"On May 26, 1954 at approximately 12:57 p.m., a mechanical failure in one of the experimental enriched uranium-water solution critical assemblies introduced a large excess reactivity causing the assembly to rise on a prompt critical period. There was no evidence of violent boiling in the system or of mechanical break down due to the energy release. The safety system apparently operated normally and the reaction was stopped automatically. All personnel in the building during the incident were protected by a minimum of five feet of concrete shielding, so no serious exposures were incurred."

The above paragraph is taken verbatum from the introduction of a preliminary report by Dixon Callihan and the 9213 staff regarding the radiation excursion.* For further information regarding the technical aspects of the accident you may refer to that report.

All Health Physics data pertinent to the accident is included in this report. There were no serious external or internal exposures to personnel and the building contamination decayed sufficiently so that all operations were back to normal by June 1, 1954.

Ralph O. Wollan

Ralph O. Wollan
Health Physics Division

ROW:cs

* Dixon Callihan and 9213 Staff "The Radiation Excursion of May 26, 1954" A Preliminary Report, CandCCC, June 8, 1954, ORNL 54-6-40

The external exposures to personnel resulting from the incident were not excessive, the highest being received by the guard on duty in the guard shack in front of the building. The fact that there were no significant exposures does not minimize the potential hazard that exists outside of the shadow from the 5ft. shield near each end of the building.

who was driving to the building on the 9213 road, reached a point somewhere in the shadow of the 5ft. shield before the incident. He had parked his car in the parking lot along side the building outside the 5ft. shielding shadow. Had the incident occurred during the time he was parking, his exposure could very well have been of the order of 10 rem. The shielding along the side walls of the building does not exceed 18 inches of concrete.

Representatives of Y-12 plant protection and X-10 and Y-12 Health Physics met with Callihan to aid in re-evaluating the emergency program and make recommendations regarding potential air-borne and direct radiation problems based on experience gained during the May 26 incident.

A continuous beta-gamma air monitor is being installed in building 9213 in order that a continuous record of air activity will be available should any incident occur in the future.

Weather Bureau Report

The office of the Oak Ridge Weather Bureau was contacted shortly after the incident. The following information, relative to the downwind drift of the contamination cloud, was furnished by R. F. Myers of that office.

On May 26, 1954 at 12:00 noon, the wind was in an E.N.E. direction at 6 mi./hr. At a distance of 1200 ft. downwind from the building there was a dilution factor of approximately 10,000. Thus for every curie/sec. emitted from the building there would be a concentration of 10^{-4} curies/M^3 at a point 1200 ft. from the source.

On May 31, 1954 at approximately 10:00 a.m., the air evacuation fans in building 9213 were turned on in an effort to remove all remaining air contamination from the building. The wind was in a N.N.E. direction at 4 mi./hr. At 2000 ft. from the building, there would a dilution factor of 100,000.

It was also indicated by Mr. Myers that the contamination would not have reached the Y-12 valley in any significant amount. This was substantiated by the fact that air samples taken downwind in the Y-12 valley did not exceed background.

9995

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO Dean Reed
LOCATION 9711-1

DATE May 14, 1952

ANSWERING LETTER DATE

ATTENTION

SUBJECT

COPY TO Forrest Clark
File

Our laboratory was asked to estimate the amount of uranium on a large (168" x 20") fiber glass filter from building 9995 air supply system. Eight randomly selected 16 in^2 pieces were cut from the filter, leached with concentrated HNO_3, rinsed with distilled water, and diluted to 100 ml. The results of duplicate analysis of 100 aliquotes were as follows:

Sample No.	Scale Fine	Scale Coarse	Reading	Total Reading
1a	X400	X5	222	1375
1b		(Calibration	227	1407
2a		factor for	255	1581
2b		X5 scale is	310	1922
3a		6.2)	250	1550
3b			250	1550
4a			272	1686
4b			280	1736
5a			270	1674
5b			253	1569
6a			225	1395
6b			257	1593
7a			260	1612
7b			215	1333
8a			205	1271
8b			100	1000

The average reading of 1516 corresponded to 1.3×10^{-6} gm of U.

$$\frac{1.3 \text{ ugm}}{16 \text{ in}^2} \times 1000^{*} \times 3360 \text{ in}^2 = 278{,}800 \text{ ugm/filter.}$$

* Dilution factor.

Don Ross

Don Ross,
Health Physics Department

DR:ms

The following is a summary of external personnel exposures received during the incident at Building 9213.

Name	Badge No.	FILM BADGE Beta-Gamma (mrep)	FILM BADGE Neutron (mrem) slow-fast	POCKET CHAMBER Beta-Gamma (mr.)	POCKET CHAMBER Neutron In % of Daily Dose	Probable Maximum External Exposure (mrem)	Nasal Smear (c/m)	Personnel Location On Map
		50		60--70	10--135			
		78				80	129.0	12
		90				90	196.5	11
		160						
		100		10	20	100	77.0	4
		175	100 150			425		9
		125				125	289.0	14
		125		55--55	105--5	125	76.5	2
		105		45--50	120--95	105	94.0	1
		100	30-120	25--35	35--50	250	51.0	3
		60						
		230				230	445.0	18
		78				80	39.5	13
		175				175	310.0	17
		125	60--35	-		220	2187.0	10
		160	60--30	65--65	100-135	250	5494.5	8
		230	180--150			560	3632.5	5
		185	150--180			515	210.0	7
		125				125	136.0	15
		150						
		50						
		125		60--60	127-70	125	2.0	6
		190				190	188.0	16
		120				120	162.0	18
		900				900	7.5	Guard Sh

The following is a summary of exposures received by film meters that were not worn by personnel.

Film Badges In Guard Shack (mrep)		Film Rings (mr.)		Cassette Film Exposures in mr. Film No.	mr.
300	250	#1	640	1000	*
310	210	2	540	1001	*
315	250	3	1400	1002	*
300	220	4	560	1011	±
300	230	5	540	1012	33,000
450	240	6	560	1021	±
100	210	7	560	1022	2,800
240	200	8	560	1031	*
305	190	9	560	1041	*
205	205	10	620	1051	*
305	200			1071	*
210	240			1072	*
210	230			1081	*
190	210			1082	*
250	205			1083	*
305	230			1091	*
210	220			2001	*
220	260			2002	*
190	230			2011	±
220	200			2012	±
220	220			2013	76,000
210	200			2021	*
220	230			2022	*
250	220			2031	*
220	200			2101	*
200	185			2111	*
255	250			2121	*
230	230			2151	*
200	220			2161	*
250	220			2162	*

± These films were so dark that the X-rayed location number was not discernible. They read 80r; 90r; 100r; 110r.

* Indicates an exposure less than 50 mr.

The following table summarizes the urine results on the persons involved in the incident. All the urine analyses were handled by the Y-12 Health Physics Research group.

URINE TABLE

Name	μc in Body *	Estimated Dose to Bones Equiv. to Sr-90 + Y-90	Results
	0.3	.1 r/wk	Exposed to approx. 1hr.
	0.1		Exposed to approx. 1hr.
	0.1		Short initial exposure but extended thereafter.
	0.06	< .1 r/wk	In control room.
	0.03		?
	0.01		In control room.
	0.01		In counting room.
	0.003		?

* All other personnel involved were below limit of sensitivity.

In the event of another occurrence, the following procedure is recommended.

1. Collect all urine samples for a period of 48 hours following the accident. Give the time of voiding as well as name and badge number.

2. Collect all feces for about 1 week.

3. Immediately begin measurements upon the urine samples and continue to do so until all have been processed.

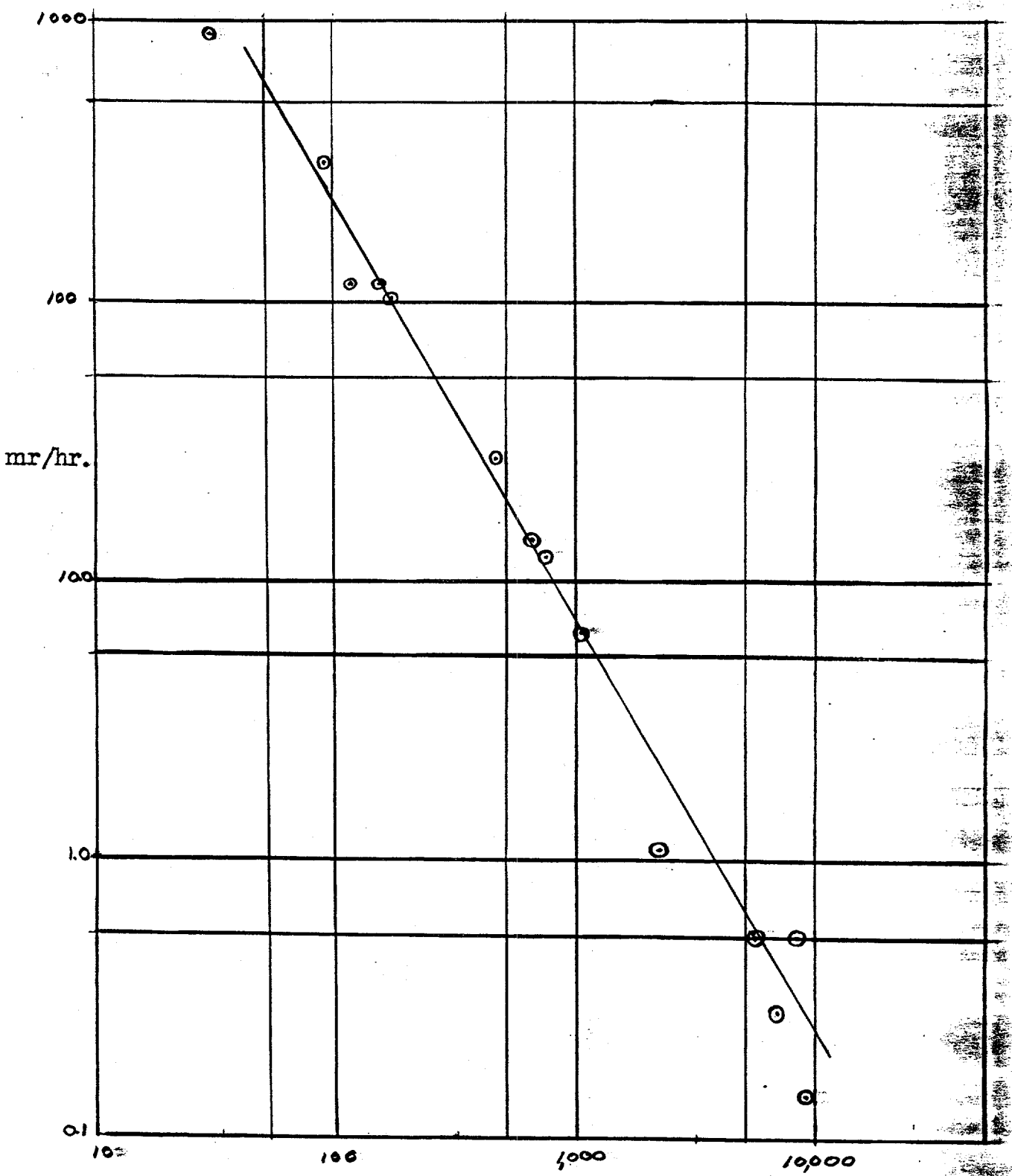
4. Use a calibrated "Dip" counter for the measurements on urine.

5. Work out a procedure for feces analysis.

6. When all samples have been analyzed and recorded plot amounts excreted per unit of time versus time and integrate area under the curve.

7. Use data in MDDC 1002 to intepret these findings.

The following is a graphical indication of the dose rate at the door to room 201 at various times following zero hour (12:57 p.m., May 26, 1954).



The following air sample results are not an exact evaluation of the air contamination as the beta counter on which they were counted has not been calibrated. A calibrated source was not available previous to the writing of this report. These results, at present, have a value only from a comparison standpoint.

Room No.	Date	Time	c/min/M^3
201	5-26-54	1445	4986.9
		1755	1293.0
		2110	895.3
		2213	589.5
		2314	329.5
	5-27-54	0015	245.0
		0115	195.5
		0215	14.9
		0831	360.0
		1017	338.0
		1136	257.0
		1508	597.3
		2125	320.0
		2239	225.0
		2339	207.0
108	5-26-54	1445	908.8
		1755	136.7
		2120	74.4
		2221	38.9
		2322	20.0
	5-27-54	0023	13.8
		0123	7.8
		0223	373.0
		0850	104.8
		1020	39.1
		1147	66.5
		1509	149.3
		2123	89.3
		2336	83.4
	5-28-54	1100	32.0
202	5-26-54	1439	54.4
		1755	429.8
		2115	178.7
		2216	81.1
		2317	71.9
	5-27-54	0018	102.7
		0118	99.7
		0218	25.7
		0828	44.7

Room No.	Date	Time	- c/min/M^3
		1013	74.4
		1132	40.8
		2124	79.0
		2337	89.0
	5-28-54	1101	27.8
Guard Shack X-10 Emergency Truck	5-26-54	1505	46.2
		1525	1.4
		1535	41.0
Walk South of Bldg.	5-26-54	1327	Read 8 mr/hr.. with 2610-A
South Truck Gate	5-27-54	0045	5.3
		0225	15.0
Guard Gate	5-27-54	0837	18.0
		1027	13.0
		1154	16.0
	5-28-54	0854	13.3
		1019	5.0
Old Guard Shack	5-26-54	2140	6.0
Foot of Guard Tower North of Bldg. 9213	5-28-54	0848	10.3
		1020	5.3
Outside West Entrance to Bldg. 9202 While Exhausting Air from Bldg.	5-28-54	1015	7.2
		1215	10.1
	6- 2-54	0945	67.0
		1017	31.1

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO LOCATION: L. C. Emerson, Y12RC, Bldg. 9202

DATE: April 27, 1954

ANSWERING LETTER DATE:

ATTENTION:

COPY TO: W. H. Baumann, S. R. Bernard, File

SUBJECT: Evaluation of the Internal Hazard from Beta Radiation in the 9212 Normal Foundry

As per a suggestion by E. G. Struxness, an attempt was made to evaluate the degree of internal beta hazard to the 9212 Normal foundry personnel by making a series of air analysis and calculating the integrated exposures. The study was continued to ascertain if the use of depleted uranium effected the beta-air level. A summation of the air results obtained is tabulated below.

Beta Air Findings - B-1 Foundry

Type of Samples	Beta-Air Concentration d/m/M³ Normal Low	Normal High	Normal Avg.	Depleted Low	Depleted High	Depleted Avg.	Average of Normal & Depleted Operation d/m/M³
Gen. Air	0	2606	82	0	20,702	139	110
Breathing Zone	0	46,000	5348	0	201,263	2467	3907
Averages	0	24,303	2715	0	110,982	1303	2008

There appears to be no significant difference between the air borne beta from normal and depleted uranium. The limit for the air concentration of beta from Th^{234} is 30,685 d/m/M³ [1]. Using this limit and making the liberal assumption that foundry personnel breath air with a Beta concentration equal to that obtained as an average on breathing zone samples for four hours per day and a concentration equal to the average of the general air results for the remaining four hours of the work day, the estimated degree of internal exposure was calculated as 6% of the MPL.

[1] Calculated by S. R. Bernard and L. C. Emerson, December 1, 1953.

Since this internal Beta exposure is extremely low, it is recommended that routine Beta air sampling be discontinued and that we continue to disregard internal Beta as has been our practice in the past.

C. M. West

C. M. West
Health Physics Department

cs

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO W. F. Cameron
LOCATION Bldg. 9206

ATTENTION
COPY TO Edw. G. Struxness, Y12RC
File ✓

DATE December 2, 1953

ANSWERING LETTER DATE

SUBJECT Uranium in Effluent Air Stream, 9211

Air tests were made in the stack which handles exhaust air from the rotary kiln drier after passing through a Type N Roto Clone for the purpose of determining the uranium content in the effluent air. The samples were taken following installation of a baffled trap on the discharge of the Roto Clone and a representative portion of the air stream was drawn off. The process in 9211 involved handling of K-25 material. The results are listed below.

Date	Sample #	U-Air Conc. mg/ft^3	U-Rate Loss lbs per day
10/22	1	0.02	0.08
10/22	2	0.64	3.1
10/22	3	0.58	2.5
10/28	4	0.42	1.8
11/8	5	0.96	4.2

Samples 1-3 were taken using paper filter media which plugged rapidly due to excessive water entrainment in the air stream. In samples 4 and 5, wet impingement was used to collect uranium particulates and excessive moisture offered no difficulty. Unfortunately the process was discontinued and further sampling stopped.

The uranium rate loss was based on an air flow rate of about 1300 cfm and 24 hour operation. The mass rate emission is quite low to cause undue concern from a general air pollution standpoint. Making certain assumptions, the maximum ground level concentration (U in air) calculates to be about $20 \mu g/M^3$ using uranium concentration values found in the table. This value has a high bias.

It was not possible to evaluate the effect of the baffled tra overall air cleaning efficiency. The daily loss appeared to be lo considering the amount of uranium processed in this period of ti

Original signed by W. H. Baumann

W. H. Baumann
Industrial Hygiene Section
Health Physics Department

WHB:cs

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO W. H. Baumann
LOCATION Bldg. 9202

DATE November 25, 1953

ANSWERING LETTER DATE

ATTENTION

COPY TO C. M. West
File

SUBJECT Air Contamination at Dry Boxes

A total of thirty-five samples were taken in C-Wing, Bldg. 9212, Room No. 257 on November 14, as a means of trying to find the source of contamination at these dry boxes. This was a non-scheduled work day, which enabled us to use several variables, such as clean gloves, clean box, dirty gloves and a dirty box during our one day of sampling.

It was believed in the beginning that the gloves were the primary contributor to such high results in this area, however, as a result of the many variables used during the operations that are carried on in the green salt area, it is believed that an improvement in the ventilation system of the dry boxes, cooperation of the operators in handling the material carefully as possible, and a routine decontamination program of the gloves and outside the dry boxes will aid in decreasing the level of air borne contamination.

Another factor which need be considered in this matter, is the confinement in which the work is carried on in this area. On the average, approximately eight mill lots are run through these dry boxes each shift. This is probably a major factor for such a high level of general air contamination as shown by the permanent air sampler and also a stationary air sample located in this area. A new ventilation system was installed in this area which should tend to reduce the general air level of contamination. This installation was put into operation on November 9, 1953. A comparision of the general air samples for the last three weeks of November with those for the month of October should give somewhat of an indication whether this installation will or will not help to lower the level of air borne contamination.

In as much, as the dry boxes have been proven to be a major contributor to higher levels of air borne contamination--if an improvement in the ventilation system of the dry boxes could be worked out, begin a routine cleaning of gloves and outside of boxes, and if the foreman in his respective area would stress the importance of handling this particular material carefully as possible; it is believed that these factors would do very much in reducing the level of air borne contamination.

The results of the experimential operational and breathing zone air analyses, taken in the dry box area of C-Wing, are shown on the following page:

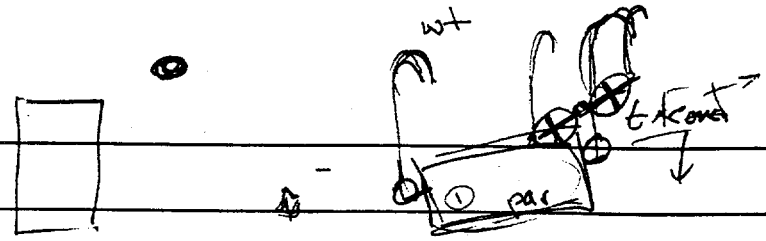
November 25, 1953

No. of Samples	Location and Description	Condition Under Which Sample Was Taken	Average $d/m/M^3$
9	C-Wing - West Dry Box	Dirty Gloves	477
14	C-Wing - East Dry Box	Cleaned Gloves	211
5	C-Wing - West Dry Box	New Gloves	133
3	C-Wing - East Dry Box	Cleaned Box - Dirty Gloves	243
5	C-Wing - East Dry Box	Cleaned Box - Cleaned Gloves	86
4	C-Wing - East Dry Box	Gloves Cleaned With Sponge	71
5	C-Wing - West Dry Box	Gloves Cleaned With Shoe Scuffs	353

E. Roberts

B. F. Rutherford

Rockford & Roberts.



Dry Boxes Variables

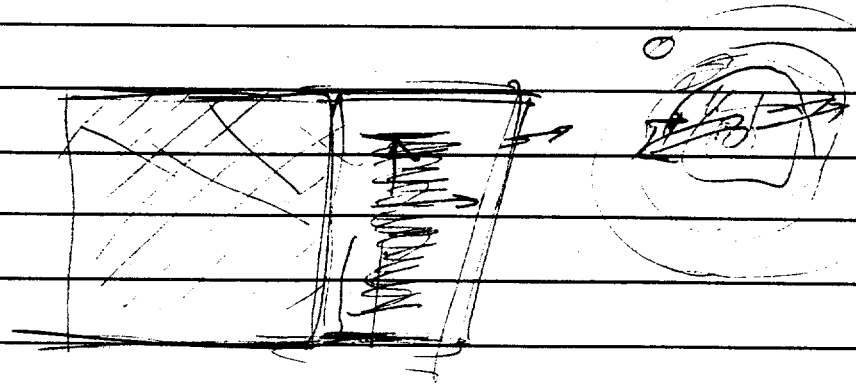
1. Vent. Dry Boxes
2. Glove Contamination -
3. Employee Cooperation in using dry boxes and handling material & equip.
4. Gen. Vent

You have made an attempt to evaluate effect of gloves on dry box contamination. What do you propose to do with other variables.

In this study how do you proposes to ~~make~~ evaluate residual cont. ~~here~~ is a lowering of cont. of a factor of 3 1/2 (477 compared to 133 d/m/M³) Can you account for 133 with clean gloves compared to 71 for gloves cleaned with sponge.

How do you think a glove decontamination procedure could be put into effect. Do you think this is a practical approach.

I understand C# 7? (G.A.) has been diminished by a factor of 20 after installation of gen. mech. exh. vent. in green salt area. Have you any data re the effect of gen. vent. on breathing zone results.



INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO H. W. Saylor
LOCATION Bldg. 9212

DATE September 30, 1953

ANSWERING LETTER DATE

ATTENTION

COPY TO J. M. Herndon
W. C. Seymour
C. E. Muzzall
E. G. Struxness, Y12RC
File

SUBJECT Air and Smear Findings At the Y-R Plant

A series of smear and air analysis were made on September 16, 1953, at the Y-R installation in Building 1413 at K-25. The results are presented in the tables below:

TABLE I

Air Analysis

Operation	U-Air Concentration ($d/m/M^3$)	Time of Sample (Minutes)
At receiving hood while plant in operation.	22	14
At receiving hood while plant in operation.	349	15
At receiving hood while plant in operation.	20	14
Under receiving hood.	9	10
Breathing Zone, unloading receiver from hood.	154	2
Breathing Zone, unloading receiver from hood.	62	3
Sample taken in Y section of plant.	352	16
Sample taken in vibrator section.	958	16

TABLE II

Smear Analysis

Number of Smears	$d/m/100cm^2$		
	Highest	Lowest	Average
12	151	2	38

It should be remembered that the samples were taken with normal uranium being processed in the Y-R and that normal uranium has a specific activity of only 1/100 of that of the enriched uranium which will be handled in this unit in 9212. In other words, the above results could be multiplied by 100 to give a rough idea of the levels of air and removable surface contamination that would be associated with a similar unit handling enriched uranium.

W. H. Baumann
Industrial Hygiene Section
Health Physics Department

CMW:cs

copy

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO J. M. Herndon
LOCATION Bldg 9706-1A

DATE August 27, 1953

ANSWERING LETTER DATE

ATTENTION
COPY TO W. F. Cameron
Clyde J. Bowles
John Thomson
Edw. G. Struxness, Y12RC
File

SUBJECT Uranium Air Contamination - Building 9206 (Rooms 40, 41, and 42)

With reference to the uranium air data on operations, ducts, and air cleaning devices in Rooms 40, 41, and 42, Building 9206, the following information is summarized for your consideration.

Air Contamination Levels

The results of air analyses reported for Rooms 40, 41, and 42 from the start of operation to the present are summarized below:

TABLE 1

Room	Description	Number Samples	% Over MPL	Average Time (Min.)	U-Air Conc. d/m/M^3
40 and 41	General Room	30	23	137	120
	B. Z., dry transfers	11	45	10	797
42	General Room	16	56	117	698
	B. Z., dry transfers	20	70	10	4675

Some changes were made in operating procedures and equipment in Room 42 after the first quarter of operation. These alterations brought about a reduction in the air levels as shown in Table 2.

TABLE 2

Room	Description	Number Samples	% Over MPL	Average Time (Min.)	U-Air Conc. d/m/M^3
40 and 41	General Room	10	10	62	45
	B. Z., dry transfers	8	25	10	375
42	General Room	6	17	69	102
	B. Z., dry transfers	10	40	7	952

It is felt that additional dust control is needed in these rooms especially during handling operations. Hoods should be increased in size in Room 42 to accommodate burning trays so that they can be loaded in the hood and not handled in the room. Illumination should be improved in the hoods so that material can be screened without opening the hood door too far. Actually dust control is more effective if the operation can be completely enclosed and ventilated with a minimum amount of air. This reduces carry out of fines in the ventilation system and minimizes the effect of stray air currents inducing particulate matter out into the rooms.

Hoods should be better illuminated in Rooms 40 and 41 so operations involving dry transfers can be carried on under the hood. All other dry material handling operations should be provided with localized exhaust ventilation. If contamination is to be maintained at a low level, these operations should be hooded and ventilated and the operation carried on within the confines of a hood. Furthermore, these changes may eliminate the need of respiratory protection which is an unsatisfactory substitute for dust control since its success is dependent entirely on the individual.

Portable vacuum cleaning is needed in Rooms 40, 41, and 42 to facilitate removing of uranium dust on equipment, trays, etc.

Type N Rotoclone

Several tests were made on the Type N Rotoclone which is installed temporarily in Room 42 to handle the furnace and hood exhausts. Isokinetic stack samples were taken simultaneously on the inlet and outlet of the collector. Gas velocities were measured with a pitot tube. The results are summarized in Table 3.

TABLE 3

Number of Simultaneous Tests	Average Efficiency %	Average Effluent U-Air Conc. $\mu g/M^3$	Average U-Rate Loss g/hr.
13	90	95	0.4

Tests were made under variable conditions with inlet concentrations ranging from 0.3 mg/M^3 to 40 mg/M^3. The Rotoclone handled 1000-1900 cfm on different tests. Effluent concentrations were quite low in uranium although considerable smoke and perhaps oil droplets were found on the outlet test filter. Preliminary tests indicate that the Type N Rotoclone is effective in collecting uranium from operations in Room 42.

Other Stack Data

Several samples were taken in the 36" x 36" duct exhausting furnaces and hoods in Rooms 40 and 41. Uranium concentrations averaged about 180 µg/M^3 (based on 6 samples). Total air flow was 11,600 cfm. Two findings were abnormally high when compared with the remaining four results. This wide fluctuation is expected because of the variations in levels of air activity associated with different operations.

Precipitron

Many tests were made on the precipitron handling exhaust ventilation from Rooms 16, 17, 40, 41 and 42. Uranium loadings ranged from 0.07 to 4 mg/M^3 with an average of 1.1 mg/M^3. The precipitron failed to perform satisfactorily when handling smoke created from operations in Room 42. At the present time, this unit is handling contaminated air from operation in Rooms 16, 17, 40 and 41; however, we have no data to estimate its performance. Tests are in progress and results will be forthcoming.

Samples were taken in the duct handling ventilation from the incinerator located in Room 42. The average effluent U-air concentration was 17 µg/M^3.

The Health Physics Department has been called upon repeatedly to suggest a safe allowable urainum concentration for stack effluents. The AEC has tentatively set up a guide covering disposal of radioactive materials from plant sites. This disposal procedure is not official, as yet; moreover, its contents are rather generic and abstract. Briefly, it states that radio-particulates should not be disposed in the environs in quantities that will account for more than 10% of a person's permissible daily exposure. It is a rather straight forward procedure to evaluate a person's occupational exposure - MPL 70 d/m/M^3 for Uranium - but the contributory exposure due to stack discharge of radio-particulate matter is very difficult to appraise since it is influenced by various meteorological factors; i.e. stack height, distance from stack, wind speed and atmospheric turbulence.

This problem was discussed with a representative from the Meteorology Section of the AEC in Oak Ridge. It was suggested that we attempt to calculate a permissible uranium level in a stack effluent provided that such parameters (stack height, stack diameter, air stream velocity, wind velocity) can be fixed. Actually the concentration of pollutant in the discharge stream is not significant for ground level concentration is proportional to the rate at which the contaminant is emitted. For convenience, the uranium concentration in the stack is calculated based upon a fixed air flow rate assumed under the given conditions.

If the hood ventilation air from Rooms 40 and 41 and the discharge of the Rotoclone in Room 42 (about 14,000 cfm) are passed into the base of the 5 ft. stack (approx. 80 ft. high) on the N.W. corner of 9206, the maximun U-air concentration should be 4 mg/M^3 to give a theoretical ground level concentration of 7 d/m/M^3 (10% of 70 d/m/M^3) which occurs at a distance of about 500 ft. downwind. This defines an average condition where dilution is due to tubulent diffusion of a pollutant emitted at a constant rate from an 80 ft. stack. The other condition in which the contamination is brought downward to the ground for short periods of time almost instantaneously following release gives a stack concentration of 2 mg/M^3. These values suggest an order of magnitude stack concentration and indicate that we would have no health problem based on the information available and the conditions assumed.

It also appears that uranium from Room 16, 17, 40, and 41 can be passed through the precipitron without creating any hazard. We should add that the stack concentrations calculated in the above do not apply to the precipitron system since this air discharges from an elbow at approximately 45° below the horizontal and we get little benefit of dilution from tubulent diffusion. If the precipitron performs satisfactorily under low loadings, the effluent may be sufficiently low that it can be discharged directly to the outdoors as it is now done (This phase of the investigation is now underway).

If air contaminated with uranium is emitted from a stack without cleaning, we depend solely on dilution with atmospheric air. If production increases and operations change, dilution alone may not be adequate and we are again faced with a potential health problem. Also it should be pointed out that we have had poor service and performance with precipitrons in the past at Y-12.

It is rather difficult to determine the degree of decontamination of a stack effluent that is necessary based on health consideration alone. Since there are many complicating factors which cannot be directly evaluated, it appears that it is far wiser to take added precaution in removing particulate matter and know that you are safe irrespective of changes; i.e., production, operational or meteorological, than to assess the problem from time to time.

W. H. Baumann,
Industrial Hygiene Section
Health Physics Department

WHB:cs

[redacted] COMPANY CORRESPONDENCE

Insert Name COMPANY Carbide and Carbon Chemicals Company LOCATION Post Office Box P Oak Ridge, Tenn.

To Mr. J. M. Herndon
Location Building 9706-1A

Date October 30, 1952

Answering Letter Date

Attention

Copy to Mr. J. C. Bowles
Mr. J. S. Reece
Mr. P. F. Galle
Mr. J. C. Little
Mr. W. L. Morgan
Mr. W. H. Shamhart
Mr. E. Zurcher
Mr. E. G. Struxness
Mr. C. M. West
File

Subject Chip Trap Evaluation in Normal Uranium Machining

Following a meeting in Mr. Reece's office regarding chip trap design and performance, it was agreed to experiment with the present device to determine the essential elements for a chip trap which has simplicity, compactness, constant resistance and a fair degree of effectiveness in removing uranium chips. This feature of simplicity is a necessity since the device must be thoroughly cleaned each month with minimum effort.

In the original design, a baffle extended over most of the bottom of the trap with a slope of approximately 3^{o} and elevated about 1" from the trap bottom to its lower ledge. The purpose of this baffle was to reduce the evaporation of water from coolant collected and to reduce entrainment of fluid or uranium in the effluent air. In the latest series of tests on the trap, an attempt was made to evaluate the chip trap without this bottom baffle.

The blast gate in the branch duct was adjusted to give a velocity of 4500 fpm (approximately 400 cfm) and samples were taken with conventional iso-kinetic sampling equipment. The results of tests taken in the duct are listed in Table number 1. Findings compare with previous test data, at same air flow rate, with bottom baffle in position.

It was observed that the effluent air from the trap had higher humidity than the room and the paper thimbles gave evidence, through their yellow discoloration, of coolant. One of the important functions of the chip trap is to remove coolant mist which is captured at the hood and conveyed through the piping; hence, an attempt was made to quantify the coolant droplets escaping the trap. The tests proved inconclusive so observations of the discoloration of the thimbles furnish only qualitative proof of the passage of coolant mist through the collector without the

bottom baffle in position. We intend to run a series of tests with the baffle and without the drip skirt which may furnish us with additional information on trap performance.

A probe tube attached to a Cascade Impactor, an instrument used in determining particle size distribution of aerosols, was inserted in the branch duct leading from the trap and a representative portion of the air stream was sampled. Results are summarized in Table 2 on the impactor findings. Preliminary tests indicate that the mass median diameter of the aerosol passing through the trap is well below 1μ (micron) which suggest an extremely fine size dust. If these results are reproduced in future testing, we may conclude that the trap, as a primary collector, is performing satisfactorily.

The chip trap collected 201.5 grams of Uranium, of which, 190 g was found to be Uranium metal consisting mostly of large chips. Using an average rate loss of 5.16 mg/min. (from Table 1 omitting Sample number 6) and 416 hours of operation, the weight efficiency of collection for the trap based on 201.5 g U is 61 percent.

W. H. Baumann
Industrial Hygiene Section

E. G. Struxness,
Health Physics Department

WB:ES:ms

TABLE #1

Sample #	Condition	Uranium Collected µg	Vol. Air Sampled ft^3	U-Air Conc. $\mu g/M^3$	U-Rate Loss mg/min	Remarks
1	Machine #423 Part setup #4	4,930	188	926	10.4	Fine cutting and polishing
2	Machine #423 Part setup #4	3,940	300	463	5.18	Fire in trap
3	Machine #423 Part setup #4	1,480	174	300	3.36	Mostly heavy cutting
4	Machine #423 Part setup #4	2,780	290	338	3.79	Mostly heavy cutting
5	Machine #423 Part setup #4	4,320	241	634	7.08	Mostly heavy cutting
6	Machine #423 Part setup #4	485	261	65.6	0.73	Fibre glass thimble used
7	Machine #423 Part setup #4	554	203	96.4	1.08	Heavy cut

Table #2

Sample #	Uranium Collected µg	Vol.Air Sampled ft^3	U-Air Conc. $\mu g/M^3$	U-Rate Loss mg/min.	Mass.Median Dia $Mg'(\mu)$ *	Standard Geometric Dev. σg**	Remarks
1	184.2	18.6	350	3.89	0.49	3.74	
2	56.8	29.4	68	0.76	0.52	2.15	
3	84.6	40.2	74.3	0.83	0.45	3.81	
4	2240	36.6	1490	16.6	0.40	1.15	2 fires in trap
5	23.3	6.0	137	1.54	0.66	2.80	Polishing operation
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$Mg'(\mu)$* - Mass median diameter (microns) is 50% size when particle size is plotted against cumulative percentage on log - probability paper.

σg** - Standard geometric deviation Ratio of $\frac{84.13 \text{ per cent size}}{50.00 \text{ per cent size}}$ from log - probability plot.

[redacted] INTER-COMPANY CORRESPONDENCE

Insert Name COMPANY Carbide and Carbon Chemicals Company LOCATION Post Office Box P Oak Ridge, Tenn.

To Location Mr. J. M. Herndon Building 9706-1A

Date October 30, 1952

Answering Letter Date

Attention

Copy to Mr. J. C. Bowles
Mr. J. S. Reece
Mr. P. F. Galle
Mr. J. C. Little
Mr. W. L. Morgan
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Mr. E. Zurcher
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File

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W. H. Baumann
Industrial Hygiene Section

E. G. Struxness,
Health Physics Department

WB:ES:ms

[redacted]

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ER-COMPANY CORRESPONDENCE

Insert Name COMPANY Carbide and Carbon Chemicals Company LOCATION Post Office Box P Oak Ridge, Tenn.

To Mr. J. M. Herndon
Location Building 9706-1A

Date October 30, 1952

Answering Letter Date

Attention

Copy to Mr. J. C. Bowles
Mr. J. S. Reece
Mr. P. F. Galle
Mr. J. C. Little
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W. H. Baumann
Industrial Hygiene Section

E. G. Struxness,
Health Physics Department

WB:ES:ms

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INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO LOCATION: Mr. H.H. MacKay

DATE: Oct. 14, 1952

ANSWERING LETTER DATE:

ATTENTION:

COPY TO: Those Listed

SUBJECT: Information Memo Relative to Health Physics Study of "Hot Castings".

During the last week in Feb. 1952, it was observed by C.W. West of the Health Physics Department that an occasional casting exhibited extremely high counts when checked with a survey meter. This was brought to the attention of other people in the Health Physics group and further preliminary studies made. Castings were checked on the foundry floor; overflows, billets and scrap parts were checked; a decomposition rate was checked on one casting for a period of about one month.

Count rates of as high as 1200 - 1400 mu/hr were noted on some castings and overflows; counts were low on billet stock, chips and briquettes, and on machined parts and scrap parts. (The normal count on uranium metal is about 50 mu/hr.)

A meeting was held in the Health Physics Department and attended by Messrs. E.C. Struxness, L.C. Emerson, E.B. Masterer, C.W. West, E. Zurcher and the writer relative to further investigation of this problem. It was decided that a technician of the Health Physics group (Mr. R.D. Collier)would be assigned this problem and that castings made under special conditions would be made available to him by the 2818 staff group.

On Sept. 30 Mr. Collier started his investigations using an available "hot" overflow and X-ray film. Castings were made available which had been made from billet stock and as had been suggested were the most active. Castings made from other material exhibited little unusual radioactivity.

This investigation is being continued by the Health Physics group and a report will be made by them upon completion.

2618-473

Information Memo Relative to Health Physics Study of "Hot Castings".

The decomposition data indicated the material to be the second decomposition product of U 238, ie. U X2 234 (or Pa 234) this material has a short half life and decomposes with the emission of a Beta particle with an associated Gamma ray having about .8 Mev energy. X-Ray diffraction of a sample taken from the "hot" surface of a casting indicated that the material may be present as the carbide.

A very short pickling of the castings in nitric acid removes all of the hot material.

G.M. Longmuir

FAH/roh

Distribution:

Mr. J.M. Horndon
Mr. J.S. Reece
Mr. E. Zurcher
Mr. K.G. Struxness
Mr. C.M. West
Mr. F.A. Harris
Mr. L.C. Emerson
Mr. H.B. Klasterer
Staff (2)
File

2618-473

Information Memo Relative to Health Physics Study of "Hot Castings".

C.W.

~~RESTRICTED~~
~~SECURITY INFORMATION~~

INTER-COMPANY CORRESPONDENCE

(Insert Name) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P Oak Ridge, Tenn.

To N. H. MacKay
Location 9212

Date October 6, 1952

Answering Letter Date

Attention
Copy To J. S. Reece,
J. M. Herndon,
E. Zurcher,
J. C. Little,
P. F. Galle,
E. G. Struxness,
W. H. Baumann,
File

Subject Approval of a Hood for the L & S Variable Speed Lathes

The results of the air sampling done on machine number 242 in A-2 Wing of 9212, where the experimental hood for the variable speed L & S lathe is installed, are summarized below.

Number of Samples	Ave. Time Samples (Min.)	Highest Concentration $d/m/M^3$	Lowest Concentration $d/m/M^3$	Weighted mean of Concentrations $d/m/M^3$
12	51	10.2	0.0	2.6

All samples were taken on set up #5, which is an outside diameter finishing operation. No polishing was done during the time the samples were being taken, and only one small fire was reported as occuring during the period covered by these samples. The hood was used properly by the machinist during the air analysis testing.

In view of the low air concentrations shown by these tests, and the fact that the hood varies only slightly from the one approved for similar operations on the 32" American lathes, this hood is approved by the Health Physics Department for use on the 32" L & S variable speed lathe.

W. H. Baumann,
Health Physics Department

Edw. G. Struxness,
Health Physics Department

CMW:WHB:EGS:mcb

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office OAK RIDGE,

TO E. G. Struxness
LOCATION 9711-1

DATE July 2, 1952

ANSWERING LETTER DATE

ATTENTION

COPY TO D. H. Reed
R. P. Ward
File

SUBJECT The Decontamination of Dyn

I. Purpose of the Experiment

To answer the question "Is Dynel easier to decontaminate than the present uniform material?" In the past, affirmative replies have not been factually substantiated and it is hoped that this experiment will either verify or disprove them.

II. Summary

An experiment of this type demands, in effect, two pieces of data - that quantity of uranium in the cloth prior to washing and that amount of uranium remaining after laundering. In as much as the supply of dynel fabric is limited the alpha count method of uranium determination was selected (rather than a chemical analyses) for procuring these data. In brief the plan is this: A number of both Dynel and cotton pieces 2" in diameter are to be contaminated by vigorous smearing on a uranium covered surface, counted in a PC-2 dust counter, stapled to a soiled uniform being sent to the laundry, washed and pressed in the normal manner, removed from the uniform and counted again in the dust counter. The cloth pieces will be retained for subsequent chemical analyses. The relative washing efficiency for each type of material will be readily obtained from these data. If necessary, a separate study to determine the cloth counting efficiency will be undertaken.

III. Procedure

1. Cut 16 pieces of cloth approximately 2" in diameter from the Dynel samples and a like number of pieces from a clean, new pair of cotton pants.	1. These will be about the maxi size piece which can be coun in a PC-2 chamber.
2. Using the Medical Dept. sewing machine stich around the periphery of the piece.	2. This is necessary to prevent ravelling during the course laundering.
3. Locate a suitable area in 9206 and liberally smear the surface of the cloth with normal uranium.	3. Be certain that no loose material is present on the surface of the cloth.

4. Count the samples in a PC-2 counter for 10 minutes.
5. Staple or pin the cloth to a soiled uniform being sent to the laundry.

6. When the laundry is returned clean, and pressed; remove the cloth and again count in a PC-2 dust counter for 10 minutes.
7. Save the cloth pieces for eventual chemical analysis.

8. Answers will be reported as percentage of material removed by laundering.

5. Notify the laundry supv. in advance in order that these clothes will not be removed or in any way given special attention.

7. A fluorometric analysis will be performed which will be compared with the uranium concentration as determined by the alpha count method.

Don Ross

Don Ross,
Health Physics Department

DR:ms

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~~SECURITY INFORMATION~~

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO F. H. Clark
LOCATION 9995

ATTENTION
COPY TO Roger Hibbs,
Mr. C. Stevenson,
C. E. West,
File

DATE June 10, 1952

ANSWERING LETTER DATE

SUBJECT Level of radioactive contamination in Building 9995 supply air.

Eleven air samples with a total volume of 1186 ft³ of air were taken in the supply air system of 9995. These samples were taken over a period of five weeks. An effort was made to take the samples when there was a slight breeze from a westerly direction. It was felt that such wind conditions present the optimum opertunity for contaminants from the 9212 exhaust air to be pulled into the 9995 supply system.

The average air concentration of radio active contaminants was found to be .5 d/m/ft³. Assuming normal material this would be .33 microgram uranium/ft³.

It is adjudged by us that these concentrations are so low that they are insignificant.

Dean H. Reed

Dean H. Reed,
Health Physics Dept.

DHReed:mb

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WCK-80 (6-51)

AIR BORNE CONTAMINATION REPORT

Material (Code) 700

Location - Bldg. No. 9995
Room No. [redacted]

ate	Sample No.	Description of Sample	Minutes	Volume	Count(2)	D/M/M^3
2-62	123 1029	At air inlet before first filter	307	121.6	8.7	.18
	123 1034	At air inlet after first filter	306	122.4	5.1	.1
-5	126 1224	" " " before " "	204	81.6	5.8	.156
	126 1226	" " " after " "	203	81.2	.2	0
-6	127 1236	At air inlet before first filter	191	76.4	15.0	.491
	127 1237	" " " after " "	192	76.8	1.1	.0358
-14	132 0950	At air inlet before first filter	350	140	4.3	.07
	~~132 0953~~	~~" " " after " "~~	~~349~~	~~139.6~~	~~[illegible]~~	~~[illegible]~~
-15	136 0946	At air inlet before 1st filter	353	141.2	12.0	.21
	136 0946	" " " after " "	350	140	4.3	.07
-19	140 0937	" " " " " "	369	147.6	3.6	.02
	140 0934	" " " before " "	370	148.0	22.7	.39